Central American species of Castilleja" in which 54 species are recognized, 17 being new to science. A clear and concise key precedes the enumeration and description of species; the same author (*ibid.* 603–608) describes 12 new species of Mexican flowering plants belonging to different genera.—B. L. ROBINSON (*ibid.* 592–596) in a "Revision of the genus Rumfordia" records six known species, of which two are here described for the first time, and (*ibid.* 613–626) under the title "Diagnoses and transfers of tropical American phanerogams" publishes 20 new species and three new varieties, and makes several new combinations.—H. H. BARTLETT (*ibid.* 597–602) gives a "Synopsis of the American species of Litsea," recognizing 11 species, 5 of which are new, and (*ibid.* 609–612) under "Notes on Mexican and Central American alders" describes one new species and three new varieties; the same author (*ibid.*, 627–637) has published 14 new species and varieties of flowering plants chiefly from Mexico, and proposes one new genus (*Basistelma*) of the Asclepiadaceae.

J. R. JOHNSTON has recently issued, as Contribution no. 37 of the above series, a "Flora of the islands of Margarita and Coche, Venezuela," based chiefly on his own observations and collections made on the islands during two expeditions, one in 1901, the other in 1903. A brief historical sketch of the botany of the islands, an account of the physical features, a catalogue of the species, a list of the economic and medicinal plants, the distribution of species, the composition and relationship of the flora are the main topics presented, to which is added a bibliography of all works that relate directly to the vegetation of the islands. Approximately 650 species are known from Margarita and Coche at the present time; and the author estimates that this number represents about three-fourths of the entire flora. Forty-two species and two new genera have been discovered on Margarita during the course of Mr. JOHNSTON'S preparation of the present publication. The relationship of the flora, as would be expected, is with the mainland. The work forms an excellent basis for future investigations on the flora of the islands; it is, moreover, of particular scientific value since the plants on which the catalogue of species is based are deposited in several of the larger herbaria of Europe and America.—J. M. GREENMAN.

Anatomy of Zamia.—MATTE[30] has recently published an addition to the number of investigations in the interesting field of cycad anatomy. Zamia is the subject of the present work, the species studied being *Zamia floridana* and *Z. integrifolia*. The paper shows the anatomy of Zamia to be of the ordinary cycad type.

In the embryo, the vascular plate of the cotyledonary node is a protostele. Each cotyledon receives three strands, which undergo the usual branching and anastomosing, and exhibit transfusion tissue at the tips. At the base of the cotyledons the strands are mesarch and may be even concentric; they are exarch in the middle and upper regions. The first leaves are opposite, but later ones

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[30] MATTE, H., Sur la structure de l'embryon et des germinations du genre Zamia L. Bull. Soc. Sci. et Med. de l'Ouest **18**: nos. 2 and 3. 1909.

have the spiral arrangement. The leaf traces arise in the cortex, between the cotyledonary bundles, and there are three for each leaf. Girdling is acquired early. There is no clearly differentiated root structure in the embryo.

The manner of germinating is the same as that described for other cycads. The tardily appearing root is tuberized by the activity of a zone of cambium which appears immediately within the endodermis, and proliferates to such an extent that the components of the root cylinder are displaced and the cortex is exfoliated. The root cylinder may be diarch, triarch, or tetrarch, and reduces toward the tip. In its lower part all the tissues are well differentiated, even the endodermis and pericycle. The stems of young seedlings have no secondary wood, the cylinder being composed entirely of endarch leaf traces, which become mesarch farther out in the leaf. The pith of this siphonostelic stem sometimes contains a few isolated vessels. Contrary to the usual custom of looking upon these vessels as remnants of the embryonal protostele, the author prefers to regard them as vestiges of ancestral structure.

MATTE corroborates the discoveries made by LAND and the reviewer that the cotyledonary node of Zamia is of the usual cycad type, that there is a tendency to lobing at the tips of some of the cotyledons, and that there is an irregularly arranged cortical cambium, though he describes the last as vaguely cambiform, and does not attribute to it any phylogenetic significance.

The microphotographs are a retrogression from the clear and beautiful drawings of the earlier papers.—HELEN A. DORETY.

Temporary anaerobiosis.—NABOKICH has published from time to time in the past ten years short papers upon the behavior of plants under anaerobic conditions; now he gives us a monograph on the temporary anaerobiosis of higher plants.[31] There is an elaborate consideration (45 pp.) of the previous work, practically all of which is decidedly adverse to his views. Then follows the experimental part, showing how anaerobic growth is recognizable and presenting the results of an analysis of its physiological characteristics, its periodicity, dependence on temperature, rôle of sugar and alcohol, energetics, and cell division.

NABOKICH reports two categories of physiological facts which are not clearly consonant. On the one hand, anaerobic growth seems to be identical with aerobic as to the grand period, geotropic response, and cell division (including karyokinesis). On the other hand, there are peculiarities of anaerobic growth, such as the course of its curve at different periods (though this can be paralleled in aerobic growth under proper conditions), its specific dependence upon temperature and sugar solutions, and the invariable death of the cells. Though NABOKICH holds that his experiments have fully established his fundamental assumption of the capacity of higher plants for anaerobic growth, he confesses that he has not succeeded in obtaining an amount of growth beyond the limits of possible for-

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[3] NABOKICH, A. J., Temporäre Anaerobiose höherer Pflanzen. Landw. Jahrb. **38**:51–194. *pls. 1, 2. figs. 2.* 1909.